

IN THE CLAIMS:

Claim 1. (Original) A printing device comprising a multitude of print head devices (clusters) which can be moved in a first direction (X) over the material to be printed, in each case with a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies), arranged side-by-side, and at least one UV light-source arrangement (130, 132, 134) to the side of the moveable print head devices (clusters) for admitting UV light to ink which cures by exposure to UV light, wherein

- the alignment (Y) of each arrangement is essentially in vertical direction, in which the print head devices (clusters) are movable (X);
- in each of the print head devices (clusters) the arrangements, that are arranged side-by-side, of printing elements in one line (jetting assemblies) are in each case offset by a micro-step in the direction (Y) of the line;
- the UV light-source arrangement (130, 132, 134), of which there is at least one, is movable together with the print head devices (clusters);
- the UV light-source arrangement (130, 132, 134), of which there is at least one, is designed such that it is suitable for partially curing the ink without completely curing it; and
- furthermore, the printing device comprises a further UV-curing light-source arrangement (136) for curing the ink.

Claim 2. (Original) The printing device according to claim 1, whereby the printing device comprises a multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed, with each cluster comprising a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies), arranged side-by-side.

Claim 3. (Original) The printing device according to claim 2, whereby the printing device comprises a first series of print head devices (clusters) arranged one behind the other in the direction (Y) of the lines, and a second series of print head devices (clusters) arranged one behind the other in the direction (Y) of the lines, beside the first series, wherein the two series are arranged so as to be offset in the direction of the line.

Claim 4. (Currently Amended) The printing device according to ~~any one of the preceding claims~~ claim 1, whereby

- in each case one UV light-source arrangement for partial curing of the ink is arranged on each side of said print head devices (clusters), wherein each UV light-source arrangement for partial curing of the ink can emit a light band at least at a length of all print head lines arranged one behind the other.

Claim 5. (Original) The printing device according to claim 4, whereby besides one of the UV light-source arrangements for partial curing of the ink, a further multitude of print head arrangements (clusters), which can be moved in the first direction (X) over the material to be printed, in each case comprises a multitude of arrangements, arranged side-by-side, of piezotechnical printing elements in one line (jetting assemblies) and a further UV light-source arrangement (130, 132, 134) to the side of the moveable print head devices (clusters) for admitting UV light to ink which cures by exposure to UV light.

Claim 6. (Original) The printing device according to claim 5, whereby in each case the first multitude and the further multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed are of the same type as a multitude of arrangements, arranged side by side, of piezotechnical printing elements in one line (jetting assemblies); and in each case the second multitude and the further multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed are of the same type as a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies).

Claim 7. (Currently Amended) A method for digital printing, in particular comprising a printing device in several colours according to ~~any one of the preceding claims~~ claim 1, wherein printing in each selected colour is carried out in the following steps:

- (A) selective printing of selected dots in a first matrix of dots in the selected colour, which dots are spaced apart by a distance which exceeds the dot size, by means of the print head lines of the first print half, which print head lines are located side by side between two UV light-sources;
- (B) partial curing of the print droplets by means of a middle UV light-source (132);
- (C) selective printing of selected dots of a second matrix of intermediate dots in X-direction with the parallel print heads of the other print half, in each case using the same colour;
- (D) partial curing of these intermediate dots, using a first outer UV light-source (130);

- (E) advancing the material to be printed in Y-direction by half the length of the distance between the jets within a jet head line;
- (F) selective printing of selected dots of a third matrix of intermediate dots, in relation to the first or second matrix, in Y-direction in the selected colour, using the print heads of the second print half;
- (G) partial curing of the print droplets by means of the middle UV light-source (132);
- (H) selective printing of selected dots of a fourth matrix of intermediate dots in X-direction, in relation to the third matrix, in the selected colour, using the print heads of the first print half;
- (I) partial curing of these intermediate dots, using a second outer UV light-source (134);
- (J) advancing the material by the length of a print head line;
- (K) repeating steps (A) to (I) until the print image is generated on the material in the selected colour; and
- (L) curing all the dots, using a curing UV light-source (136);

wherein printing takes place according to steps (A) to (I), at first in a first colour, and then at each repeat step (K) printing is added in a further colour, until print as been applied in all colours.

Applicant(s): Kilian HINTERMANN
Appl. No.: 10/733,764

Claim 8. (Original) The method for printing according to claim 7, whereby at the end of the material to be printed, first printing of the first colour and then printing of subsequent colours in turn is completed.

CLAIMS

1. A printing device comprising a multitude of print head devices (clusters) which can be moved in a first direction (X) over the material to be printed, in each case with a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies), arranged side-by-side, and at least one UV light-source arrangement (130, 132, 134) to the side of the moveable print head devices (clusters) for admitting UV light to ink which cures by exposure to UV light, wherein
 - the alignment (Y) of each arrangement is essentially in vertical direction, in which the print head devices (clusters) are movable (X);
 - in each of the print head devices (clusters) the arrangements, that are arranged side-by-side, of printing elements in one line (jetting assemblies) are in each case offset by a micro-step in the direction (Y) of the line;
 - the UV light-source arrangement (130, 132, 134), of which there is at least one, is movable together with the print head devices (clusters);
 - the UV light-source arrangement (130, 132, 134), of which there is at least one, is designed such that it is suitable for partially curing the ink without completely curing it; and
 - furthermore, the printing device comprises a further UV-curing light-source arrangement (136) for curing the ink.

2. The printing device according to claim 1, whereby the printing device comprises a multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed, with each cluster comprising a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies), arranged side-by-side.
3. The printing device according to claim 2, whereby the printing device comprises a first series of print head devices (clusters) arranged one behind the other in the direction (Y) of the lines, and a second series of print head devices (clusters) arranged one behind the other in the direction (Y) of the lines, beside the first series, wherein the two series are arranged so as to be offset in the direction of the line.
4. The printing device according to any one of the preceding claims, whereby
 - in each case one UV light-source arrangement for partial curing of the ink is arranged on each side of said print head devices (clusters), wherein each UV light-source arrangement for partial curing of the ink can emit a light band at least at a length of all print head lines arranged one behind the other.
5. The printing device according to claim 4, whereby besides one of the UV light-source arrangements for partial curing of the ink, a further multitude of print head arrangements (clusters), which can be moved in the first direction (X) over the material to be printed, in each case comprises a multitude of arrangements, arranged side-by-side, of piezotechnical printing elements in one line (jetting assemblies) and a further UV light-source arrangement (130, 132, 134)

to the side of the moveable print head devices (clusters) for admitting UV light to ink which cures by exposure to UV light.

6. The printing device according to claim 5, whereby in each case the first multitude and the further multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed are of the same type as a multitude of arrangements, arranged side by side, of piezotechnical printing elements in one line (jetting assemblies); and in each case the second multitude and the further multitude of print head devices (clusters) which can be moved in the first direction (X) over the material to be printed are of the same type as a multitude of arrangements of piezotechnical printing elements in one line (jetting assemblies).
7. A method for digital printing, in particular comprising a printing device in several colours according to any one of the preceding claims, wherein printing in each selected colour is carried out in the following steps:
 - (A) selective printing of selected dots in a first matrix of dots in the selected colour, which dots are spaced apart by a distance which exceeds the dot size, by means of the print head lines of the first print half, which print head lines are located side by side between two UV light-sources;
 - (B) partial curing of the print droplets by means of a middle UV light-source (132);
 - (C) selective printing of selected dots of a second matrix of intermediate dots in X-direction

with the parallel print heads of the other print half, in each case using the same colour;

- (D) partial curing of these intermediate dots, using a first outer UV light-source (130);
- (E) advancing the material to be printed in Y-direction by half the length of the distance between the jets within a jet head line;
- (F) selective printing of selected dots of a third matrix of intermediate dots, in relation to the first or second matrix, in Y-direction in the selected colour, using the print heads of the second print half;
- (G) partial curing of the print droplets by means of the middle UV light-source (132);
- (H) selective printing of selected dots of a fourth matrix of intermediate dots in X-direction, in relation to the third matrix, in the selected colour, using the print heads of the first print half;
- (I) partial curing of these intermediate dots, using a second outer UV light-source (134);
- (J) advancing the material by the length of a print head line;
- (K) repeating steps (A) to (I) until the print image is generated on the material in the selected colour; and
- (L) curing all the dots, using a curing UV light-source (136);

wherein printing takes place according to steps (A) to (I), at first in a first colour, and then at each repeat step (K) printing is added in a further colour, until print as been applied in all colours.

8. The method for printing according to claim 7, whereby at the end of the material to be printed, first printing of the first colour and then printing of subsequent colours in turn is completed.